

A Model Students E-Counselling Portal

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Abstract: Counselling is a professional activity that utilizes an interpersonal relationship to enable people to develop self-understanding and to make changes in their lives. Students in universities face challenges that require counselling services. Unfortunately, a good number of students do not have physical access to counsellors due to time constraints, distance and lack of enough counselling professionals. These challenges can be solved through integration of current technological trends to the counselling process. In this paper, the current mode and factors affecting students counselling for Moi University students were evaluated leading to the development of a prototype student's e-counselling portal. To gather requirements, 5 staff from the ICT department and 5 staff from the dean of student department were interviewed. A focus group comprising of 15 students was also formed. The findings revealed that counselling is conducted in five different ways in the university including: face to face, print media, peer counselling, telephone and psycho-education. It was further revealed that these methods lacked anonymity, immediacy, quick accessibility and awareness. All respondents felt that a web based solution would be more accessible, immediate and would offer more privacy. A model student's e-counselling portal that could be used to improve the student's counselling process was developed and tested with the dean of student's staff in Nairobi Campus. The student's e-counselling portal was recommended for full development and adoption, not only by Moi University, but also by other institutions of higher education. It was also recommended for use by hospitals and other counselling institutions.

Keywords: Counselling, Online counselling, Web based counselling system.

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1. Introduction

Counselling is a very fundamental requirement for students in higher education institutions. Every institution of higher learning normally has a counselling department fully functional. This is due to the high demand for counseling services among students. Oye *et al.*, (2012) explains that the importance of guidance and counselling in schools, include bringing an increased understanding of the education, vocational and social information to students in order to make wise choices. Students' guidance and counselling helps to eliminate ignorance and help the individuals to make sound choices in life. Richard and Vigano (2011) refers to web counselling as counselling services through the internet and includes: emails, chat rooms and web cameras. The aim of counselling is to find ways to live in a more satisfying manner through more creative management of available resources.

Evans (2009) states that there is rapid demand of online counselling and support services within diverse areas such as career guidance in institutions of higher education and mental health services. Unfortunately research and project evaluations which have been conducted within the context of online practice have not been widely disseminated or publicized. As stated in Techtarget (2017) Information communication technology (ICT) can be described as the infrastructure and components that enable modern communication. ICT includes: computer hardware, computer network infrastructures, telecommunication infrastructures and software that when combined allow people to interact and manage organizations in the digital world. Use of ICT developments has become a new trend in almost all spheres of life.

The knowledge of ICT usage improves human capacity in every field of human endeavors such as conducting business transactions, industrial operations, educational programmes and activities in all aspects of life in general. ICT can be viewed as a revolution that involves the use of computers, internet and other telecommunication technology in every aspect of human activities. Oye *et al.*, (2012) explains that the role of ICT on students guidance and counselling can be viewed in three ways: as a tool, as an alternative, or as an agent of change. The growth of websites and help lines as forms of technically mediated service delivery means that ICT can be viewed as a tool and as a change agent. The telephone, websites, web-portals and e-mail, alongside face to face facilities can be viewed as alternatives of counselling services.

2. Problem Statement

Students in universities face challenges that require counseling services. The Importance of guidance and counselling programmes include bringing to the students an increased understanding of the educational, vocational and social information needed to make wise choices. As such, it's very important that every student should have access to a counsellor anytime, anywhere. Unfortunately there are a few professional counsellors available to offer these services and most of the students have to travel long distances to access counselling services. Many students do not have physical access to counsellors due to time, distance and lack of enough counselling professionals.

In Moi University, distance, time and few counselling professionals are real constraints in accessing guidance and counselling. This is because campuses are far from the Main Campus where the dean of student's office is located. The Campuses have a dean of student's office but has very few members of staff who can conduct counselling. There are 15 members of staff who are trained counsellors in the university. The world is becoming a global village due to the influences of technology. The use of modern technology has brought a lot of flexibility in many disciplines. Today, internet has made resource sharing very easy and this is a good opportunity to provide online counseling to students. Online counselling would offer accessibility and convenience to many clients. Costs would also be lower than face to face counselling due to reduced overheads.

People in remote areas or people who are housebound due to disability or other commitments can still access the counselling services online without having to travel. People who travel extensively or who have time constraints may utilize online therapeutic services at their convenience. Moi University Main Campus and the other constituent campuses can share the available pool of counsellors. Moreover, one does not have to be restricted to the only reachable counsellors but can get help from counsellors in any part of the university. This study addressed this problem by providing an online solution which could facilitate online counselling. Co-counselling is where a student can seek counselling from a different

counsellor rather than being limited to those available within a specific campus. Students with counselling issues that require the attention of chaplains can use the Students e-Counselling Portal to reach the only chaplain located at Main Campus.

3. Literature Review

According to Velleman and Sarajane (2010) counselling is a complex subtle and sometimes fraught process in which two or more people are genuinely in touch with each other and are seeking to effect some change. This change may be simple or it may be change that has dramatic implications for a person's life. Kraus *et al.*, (2010) explains that professionals interested in conducting therapy in cyberspace must be familiar with the various formats available to them. They must have the technical knowledge to operate hardware and software. They must also understand how clients may be using technology to address their health and mental needs. Therapists must also educate themselves on the computer basics necessary for facilitating online groups, including troubleshooting certain technical problems, editing, saving and deleting messages and ensuring privacy and confidentiality.

Kraus *et al.*, (2010) further explains that therapists interested in maintaining viable online clientele will be required to maintain consultation with internet experts who can keep them abreast with current and emerging technologies. As an example Kraus *et al.*, (2010) gives video-conferencing as one of the newer technologies which previously was not affordable due to cost and technical difficulties. From the past literature, there are various counselling systems in use today. They are as follows:

3.1 Conventional Counselling (Face To Face)

Counselling is conducted by holding a counselling session in the counselling room. According to Gay (1988) this counselling method is the oldest and was first adopted by Freud where the patient talked through his or her problems as the counsellor listens. This was known as the 'talking cure'. The client meets the counsellor in the room and they both sit down carryout a counselling session and if need be another session is scheduled.

3.2 Telephone Counselling

Hailey *et al.*, (2008) explain on the use of telephone conversation to conduct counselling. He refers to it as Telemental counselling. They conducted a research on telemental counselling and they found this system of counselling to be successful. The main short fall with this counselling system is that the counsellor cannot see the client and therefore can only judge from the voice.

3.3 Breakthrough.Com

This is a public online system that one can sign up and is connected to a practitioner who would then offer counselling. This is an existing online counselling system which the researcher found to be close to what this research intends to implement as given by Breakthrough Support (2011) in <http://support.breakthrough.com>

3.4 Skype Counselling

Yates Andrian (2011) in his website <http://www.therapyworld.net> explains how he uses Skype for counselling. He establishes contacts with his clients who then join his Skype contacts. Breakthrough Support (2011) in <http://support.breakthrough.com> explains that Skype and other conferencing systems are not recommended for therapy because they don't comply with the best practices as given by Health Insurance Portability and Accountability

Act (HIPAA), which is the first comprehensive Federal protection for the privacy of personal health information.

3.5 Text Based online Counselling: Asynchronous online counselling (E-mail)

According to Kraus *et al.*, (2010) Online Asynchronous text based counselling is the exchange of therapeutic communication between a client and a counsellor using electronic mails (E-Mails).

Kraus *et al.*, (2010) explains that this counselling system is not restricted by geographical location or scheduling difficulties. Clients are able to send messages any time of the day. This is of great benefit to isolated people as physical and other mobility limitations may be overcome.

Model Students E-Counselling Portal Using Evolutionary Prototyping Methodology

The Model Students E-Counselling Portal is a web application. According to Pressman Roger (2010) the attributes of most web application includes network intensive, content driven and continuous evolution. In this study evolutionary prototyping system development methodology was adopted. Evolutionary Prototyping is an agile system development life cycle methodology used in the development process when developers are faced with rapidly changing, unclear, or incomplete requirements.

According to Nyadowe (2014) evolutionary prototyping is the process whereby a prototype goes through various stages of improvement until it meets the user requirements. In this study, initial prototype with basic functions was created. The system was tested with the users. Users gave feedback on any changes required to improve the interactions and the usability of the prototype. This methodology was adapted due to its many advantages including: the delivery of the product is faster; user engages with the product before deployment, product meets the requirements and the developer also learns from the users' feedback. The difficult in fully specifying the requirements at the beginning of the project development made use of conventional methods unsuitable for web applications development. Furthermore, this model could be justified since full system specifications could not be developed in advance. The phases of evolutionary prototyping include:

- a) Initial Phase- One develops an abstract specification. The initial requirements are gathered and plan for the creation of a prototype is done
- b) Design Phase- Creates initial prototype and use it to define the requirements
- c) Refine phase- Review the prototype and add or redefine requirements in details
- d) Release prototype -when enough requirements have been created release a working version of the prototype. Feedback is used to update the product
- e) Release the final version- When enough requirements have been completed and approved a final version is created and released

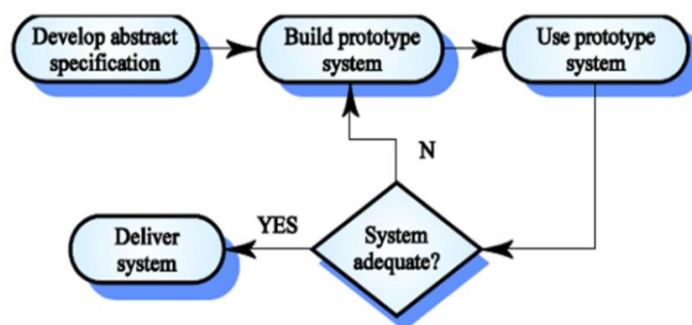


Figure 1. Evolutionary prototype model, Source: Somerville Ian (2010)

Design

Kumar (2005) explains that research design is a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately and economically. This study adopted a case study strategy of a qualitative research design. Case study method was preferred in this study in order to have a more in-depth understanding of the subject area under study in the selected institution. The case under study was taken on the students' guidance and counselling in Moi University. According to Stark and Harry (2005) a case study assumes that things may not be as they seem and prefers in-depth inquiry over coverage, understanding the case rather than generalizing to a large population. It is particular, descriptive, inductive and ultimately heuristic, seeking to illuminate the readers understanding of an issue.

Requirements Gathering

Purposive sampling technique was used to get a sample that gave the required information. According to Dudovskiy John (2013) purposive sampling is also known as selective or subjective sampling. It is a sampling technique in which the researcher relies on personal judgement when choosing members of population to participate in the study. This technique is cost-effective and time-effective. Purposive sampling technique allowed the researcher to use cases that have the required information with respect to the objective of the study. The sample population identified was small though the respondents provided in-depth information about web-based student's guidance and counselling. The researcher interviewed staff and students in Moi University. Staff in dean of students department and ICT staff in Moi University were interviewed whereas a focus group for students was formed. Face to face interview was scheduled with the ICT staff and dean of students department staff in Moi University. Unstructured and open-ended questions were asked so as to elicit views and opinions from the participants. A group interview comprising of thirteen students was formed and the researcher guided the focus group discussion using a focus group guide.

5. Requirements Analysis

According to Somerville Ian (2011) user requirements are statements, in natural language, plus diagrams of what service the system is expected to provide to system users and the constraints under which it must operate. The table below shows the requirements as analysed from the responses above: M will be used to denote mandatory requirements. D will be used to denote desired, F will denote future development.

User Requirement

Requirement	Priority
Counsellors gender must be shown	M
Ability to choose the counsellor that one wants	M
Links that will help create awareness	M
Give self-help information to those needing counselling	M
Give assurance on secrecy	M
The system must be interactive	M
The system should allow for anonymity	M
The system should incorporate some visual effects	M
The system should be available online	M
The system must be secure	M
User information must be protected	M
The system should allow for psycho-education	M
The system should allow for appointments to be scheduled with counsellors	M
The system should show counsellors gender and specialty	M
The system should be easy to use	M
The system should have help information on how to use	M

System Requirements (Functional Requirements)

According to Somerville Ian (2011) system requirements also referred to as functional specifications are more detailed descriptions of the software system's functions, services and operational constraints. In this research the system requirements were divided into functional and non-functional requirements. Somerville Ian (2011) describes functional requirements as the statements of service the system should provide, how the system should react to particular inputs and how the system should behave in particular situations. On the other hand, he describes non-functional requirements as constraints on the services or functions offered by the system.

Functional Requirements

	Functional Requirements	Priority
1.	The system should have ability to select the gender of the counsellor	M
2.	The system should allow to select the counsellor one prefers	M
3.	The system Users shall authenticate themselves	M
4.	The system should allow for anonymous/guest login	M
5.	The system shall have approval for users by a moderator/administrator	M
6.	The system should be interactive	M
7.	The system should have materials for self-help psycho-education	M
8.	The system should have Tips on how to use	P
9.	The system Will have some visual effects	P

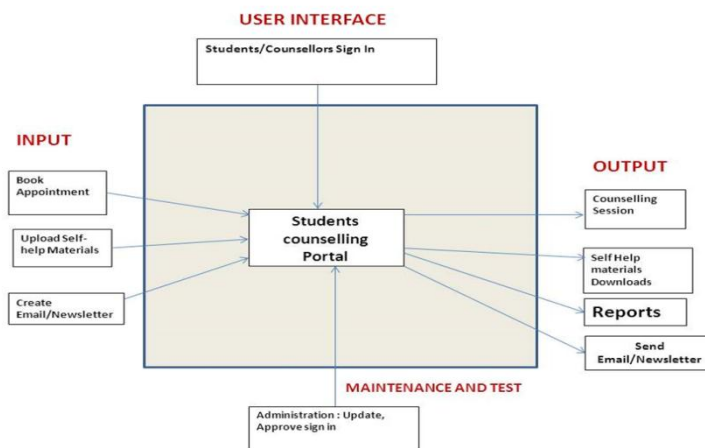
Non-Functional Requirements

	Non-Functional Requirements	Priority
1.	The system should be available anytime	M
2.	The system should be accessible online	M
3.	The system should be secure	M
4.	The system should be robust enough to recover from error	M
5.	The system should be easy to use.	M
7.	The system should be easy to train	M

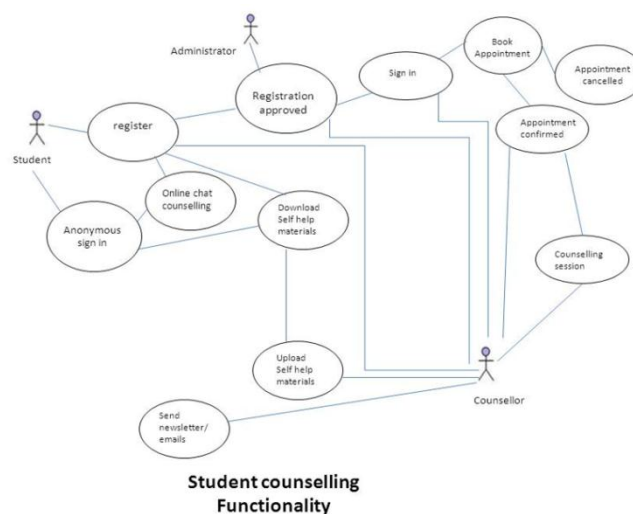
System Modelling

According to Somerville Ian (2011), system modelling is the process of developing abstract models of a system, with each model presenting a different view or perspective of that system.

Model Students E-counselling Portal Content Diagram



Use Case Model



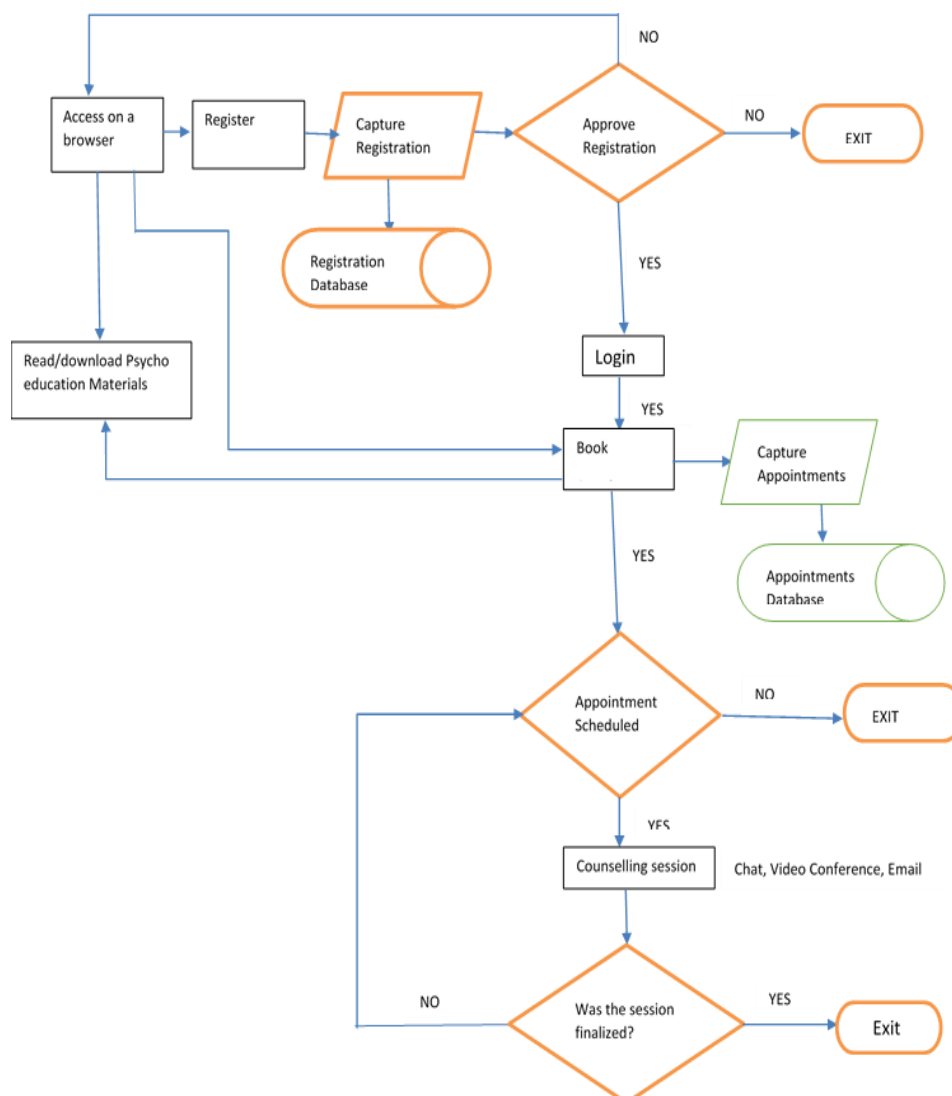
Explanation

The above diagram is a use case representing the student counselling system. The actors in this use case are the student, administrator and the counsellor. The various use cases are as shown in the diagram.

6. System Design and Development

The information or data flow diagram (DFD) for the Model Students E-counselling Portal was developed. The data flow diagram revealed relationship among and between the various components in the system. The DFD showed how input data was transformed to output results through a sequence of functional transformation.

Model Students E-Counselling Portal Data Flow Diagram



Development Tools

To develop the student's E-counselling portal a client server architecture was adopted. On the server side apache server was used with MySQL Database. HTML5, Java script and PHP were used to write the codes.

Components of the system

User Interface Design

The Model Students E-counselling Portal was to be accessed on the web. One of the major consideration was on accessibility online by the users and ease of use once the users accessed the system. A banner that gives the identity of the system was done as the header. Menu for the links to the various pages were created. For aesthetic value cool colors theme of green and light blue were preferred.

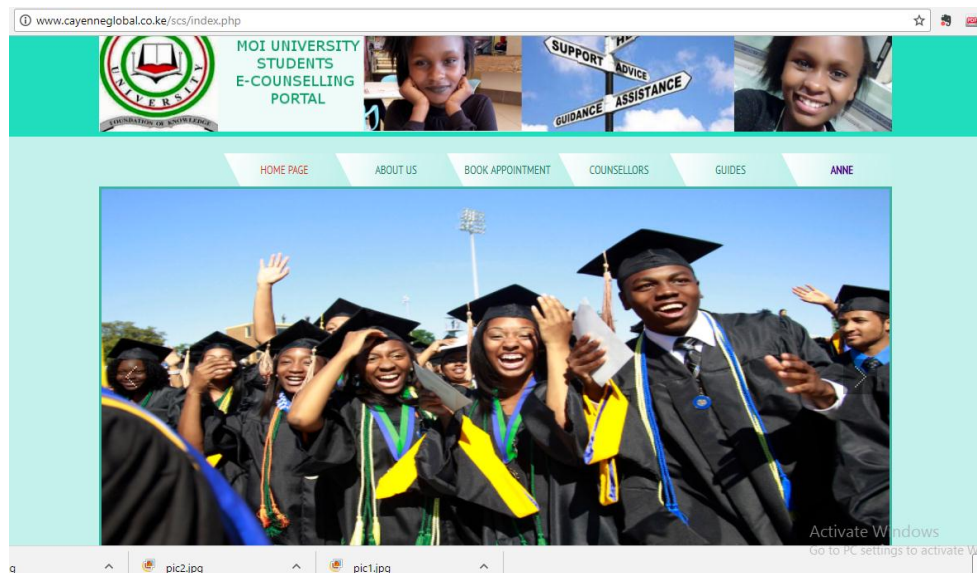


Figure 2. User Interface Design

Navigation Design

All the users were to access the Model Students E-counselling Portal from the home page where they were to login to the system or sign in as new users. Main menu was displayed on the Top Menu Bar. The users were to navigate to any page that they had permission to access - through the main menu.

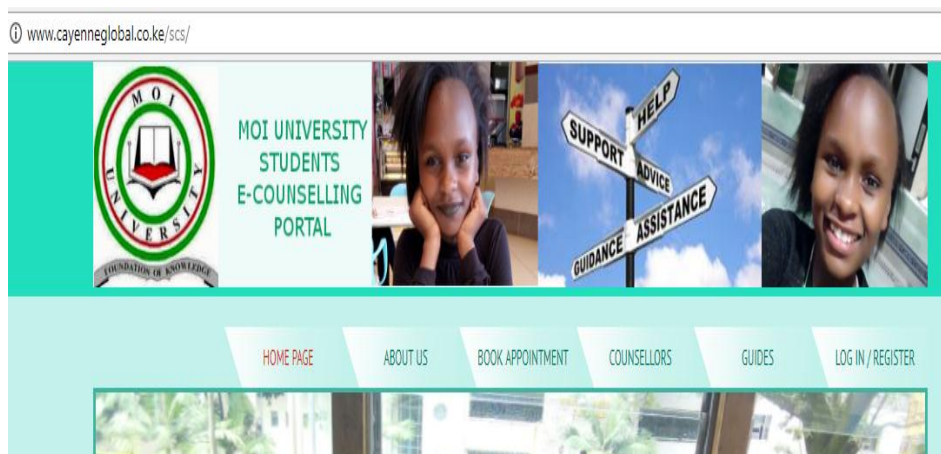


Figure 3. Navigation Main Menu

First Time Registration Design

A student or a counsellor would first register so as to have access to the system.

The screenshot shows a web browser window with the URL www.cayenneglobal.co.ke/scs/login.php#demo2. The page has a green background and a white registration form titled "GET YOUR ACCOUNT HERE". The form contains several input fields: "FirstName", "LastName", "SurName", "Email Id", "Username", "Password", "Confirm-Pass", "Mobile", "Designation" (a dropdown menu with options: student, Counsellor, Admin), "Gender", and a "Choose File" button. At the bottom of the form, there are two buttons: "Back To Login" and "Register Now".

Figure 4. Student/Counsellor Registration

Administrator Validation

The Admin would validate the registration and approve:

The screenshot shows the administrator's user home page. The URL is www.cayenneglobal.co.ke/scs/userhomepage.php. The page features a sidebar with a user profile for "ANNE WAMATHA" and buttons for "Upload Counselling Materials" and "See Join Requests". The main content area displays a table of registrations:

PHOTO	NAME	DESIGNATION	STATUS
	Jack James	counsellor	APPROVE IGNORE

On the right side of the page, there is a "Log Out" button and a section titled "Online Counsellors" listing "Jack James".

Figure 5. Admin Approves/Rejects Registration

Student Appointment Booking

After login a student could book an appointment with a counsellor of choice.

The screenshot shows the student appointment booking page. The URL is www.cayenneglobal.co.ke/scs/book_appointment.php. The page has a green header with the "E-COUNSELLING PORTAL" logo and navigation links: "HOME PAGE", "ABOUT US", "BOOK APPOINTMENT", "COUNSELLORS", "GUIDES", and "JOHN". The main content area features a profile card for "MR. JOHN JAMES", an Academics Counsellor, with a "BOOK APPOINTMENT" button. The card also displays fields for "Field" (Academics) and "Mobile" (12345), and a description: "Counselling session on career choice".

Figure 6. Student Appointment Booking

Counsellor

A Counsellor could login and accepts an appointment. The counsellor could also schedule an appropriate time for the appointment. Counsellor may also send an email to the student.

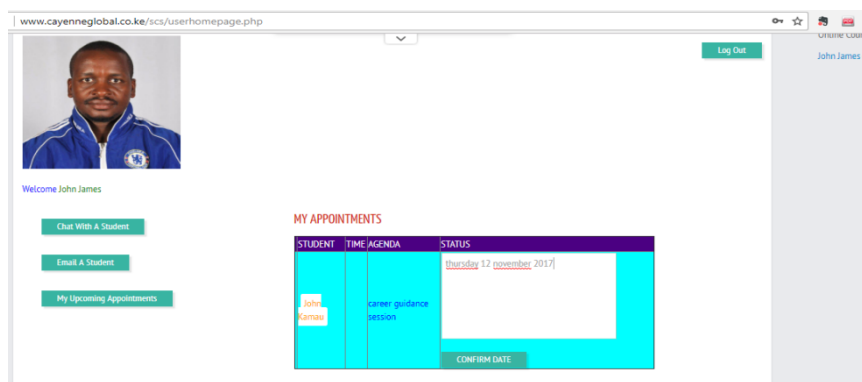


Figure 7. Counsellor Confirms Appointment Booking

Counselling chat session

Counselling chat session were not stored in history. This meant both student and counsellor must be online for a chat session. To create the chat session, bootstrap chat widget was used as the interface for communication. A user types the message on the chat widget and clicks send or press enter on the keyboard. The message is received by a PHP file (messagereceiver.php), which stages it in the message table in the database. The message is then flushed out to the recipient by a PHP file (checkmsg.php) and clears it from the staging table.

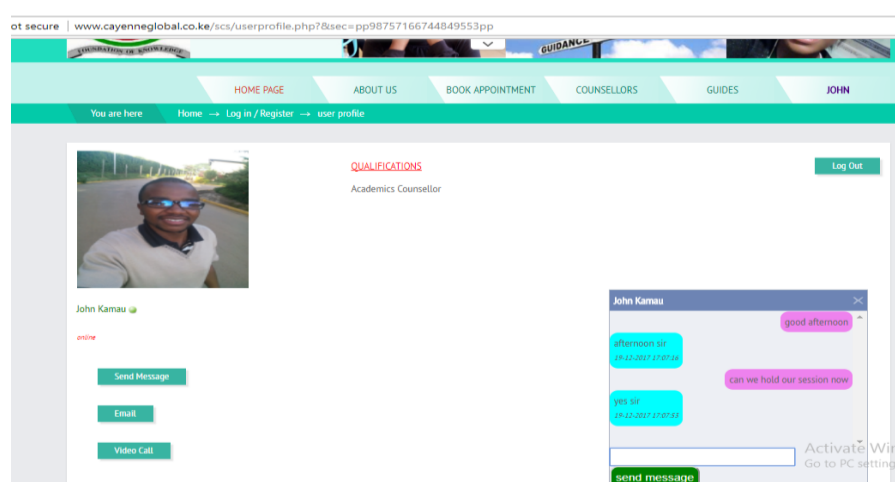


Figure 8. Counsellor/ Student Chat Session

Video call Session Prototype

The content of a video call is not recorded as per the functional requirements. To create the video call session webRTC architecture was used. WebRTC is an open-source project supported by Google, Mozilla and Opera. The API and underlying protocols are developed jointly at the World Wide Consortium (W3C) and Internet Engineering Task Force (IETF). It allows audio and video communication to work inside webpages by allowing direct peer to peer communication. According to WebRTC (2018) WebRTC code is under free license, thus

allowed to be used without restriction. The major components of webRTC includes the following JavaScript APIs:

- **Get User Media:** acquires the audio media by accessing a device camera and microphone
- **RTC Peer Connection:** enables audio and video communication between peers.
- **RTC Data Channel:** allows bidirectional communication of arbitrary data between peers
- **Get Stats:** is a statistics function which allows the web application to retrieve a set of statistics about webRTC sessions.

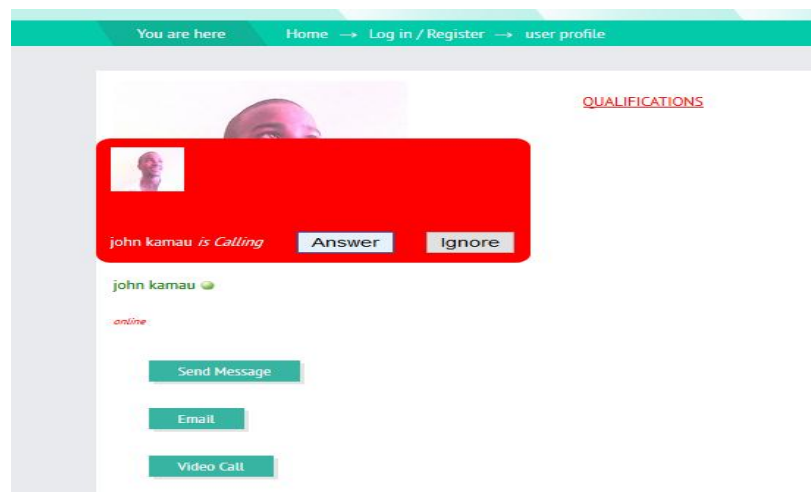


Figure 9. Counsellor /Student Video Call

Awareness

Students counselling awareness was achieved by adding social media links including facebook, twitter, linkedin, google Plus and youtube links. This was placed on the footer section of the home page.



Figure 10. Awareness Links

Psycho-education

Psycho-education was achieved by providing link for the system administrator to upload reading materials. The students can then download the materials for extra reading.

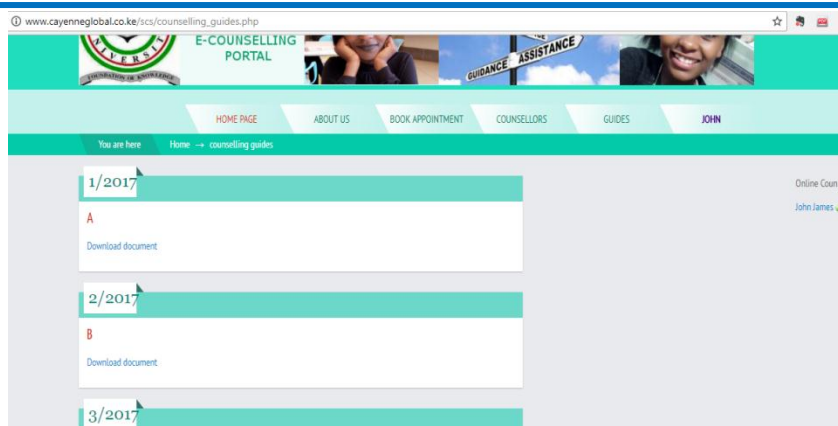


Figure 11. Counselling Materials Upload

Verification, Validation and Testing

System verification ensured that the system achieved its goals without bugs and gaps while on the other hand validation ensured that the system met the high level requirements and thus it fulfilled its purpose. Dummy counselling sessions were done to verify if the system was doing what it was intended to do. All processes were simulated end to end to validate the system. The system can be accessed on <https://www.cayenneglobal.co.ke/scs/>

7. Conclusion and Recommendations

This research established that counselling is a very fundamental issue in all institutions of higher learning. In the literature review it was established that counselling is a wide study which is conducted in various ways. It was also discovered that there have been various attempts to carryout internet based counselling. Some of the benefits stated on conducting online counselling included availability, affordability and anonymity. In research methodology, a sample of the population to gather data from was identified. In data analysis it was established that the current mode of counselling does not adequately cover students in Moi University. In this research, a prototype Model Students E-Counselling Portal was developed. The prototype developed was web based. The following recommendations were given for the proper implementation of the students web based counselling system.

- a) It was recommended that the prototype could be developed for adoption by the university's counselling department.
- b) For a successful implementation and adoption of the web based counselling system it was recommended that the university develops a policy and a strategy that would include web based counselling in the guidance and counselling department.
- c) It was also recommended that other universities could be encouraged to adopt web based mode of students counselling.
- d) The study could also be shared with the ministry of health for adoption in the health sector.

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